Fuel Tank Inerting Harmonization Working Group
FAA Concerns with Assumptions and Conclusions

Summary: The FAA, as a member of the FTIHWG, disagrees with certain assumptions and has questions on other assumptions used in this study. The assumptions used in the study are critical to the cost estimates provided for the fuel tank inerting options studied. Therefore, the FAA has some reservations as to the accuracy of the Working Group's conclusions expressed in this report. Those conclusions produced inerting system cost estimates in the tens of billions of U.S. dollars with relatively minor benefits from inerting for the fifteen-year study period. The FAA's questions can only be answered following a full review of the data in the appendices to this report. As stated in the Task, the FAA will use the data in the report and results of independent FAA research and development programs in evaluating if a practical means of inerting fuel tanks can be found for the in-service fleet, new production airplanes, and new airplane designs. This attachment to the report provides an explanation of the most significant issues.

Significant FAA Disagreements:

- Ground Based Inerting, Dedicated Personnel Not Required: The FAA disagrees that the person who would perform the inerting tasks needs to be a dedicated person or remain present and observe the entire inerting process after connecting the nitrogen enriched air (NEA) hose to the airplane connection, opening valves and starting the inerting of the tank(s). This is in conflict with the conclusion of the FAA/industry team contained in FAA report DOT/FAA/AR-00/19, *The Cost of Implementing Ground-Based Fuel Tank Commercial Fleet*, dated May 2000. In addition, the safeguards included in the design concepts developed by the task team preclude the need for dedicated personnel to observe the process. The use of dedicated personnel has a very significant contribution to the total estimated cost for ground-based inerting presented in the report.
- Ground Based Inerting, Technician (Mechanic) not required: The FAA disagrees that a technician (mechanic) is required, even for some start-up period, to perform the tasks required to inert the fuel tanks
- Special Federal Aviation Regulation (SFAR) No. 88, Predicted Accidents Avoided: The report assumes that the SFAR would prevent 75 per cent of future fuel tank accidents. This assumption has a very significant affect on the predicted benefits for fuel tank inerting shown in this report. The 75 per cent prediction is not supported by any data or by the FAA Final Regulatory Evaluation that was included in the final rule that issued the SFAR (docket number FAA–1999–6411, published in the Federal Register on May 7, 2001). When performing that final regulatory evaluation, in response to comments received to the notice and further analysis, the FAA determined that such a prediction has no acceptable mathematical basis. In addition, the ignition source in the three most recent fuel tank explosions (1990 Philippine Airlines, 1996 TWA 800, and 2001 Thai Airways) has not been determined. The SFAR, and any resulting required modifications, could eliminate possible failures and malfunctions that have been identified since the TWA 800 accident that can cause an ignition source, and this will provide a needed improvement in the safety of fuel tanks. However, even if all those potential ignition sources were eliminated as a

result of the SFAR, there is no way to positively determine if that action would have prevented those accidents. This is very important in the FAA's overall program to prevent future fuel tank explosions. That is the reason for the FAA's determination that it will take both eliminating potential ignition sources and eliminating or significantly reducing the exposure of fuel tanks to flammable fuel/air mixtures to provide an acceptable level of safety.

- Hazard to Passengers and Crew from Inerting Systems: The FAA disagrees that nitrogen enriched air (NEA) or oxygen enriched air produced by the membrane separation technology used in the study creates a hazard for passengers and crew of the affected airplanes (on-board or ground-based designs). The design concepts used in the study included features to preclude leakage of either NEA or the oxygen enriched air byproduct of the inerting systems from entering (pressurized) areas of the cabin that would be occupied by passengers and flight crew members. In addition, existing Federal Aviation Requirements would prevent obtaining FAA approval of any inerting system design that would prevent a hazard to passengers or flight crews.
- Hazard to Maintenance Personnel from Inerting Systems: The FAA disagrees that nitrogen enriched air (NEA) or oxygen enriched air produced by the membrane separation technology used in the study creates a significant hazard for maintenance personnel working on or near the affected airplanes (on-board or ground-based designs). The design concepts used in the study included features to preclude leakage of either NEA or the oxygen enriched air byproduct of the inerting systems from entering (pressurized) areas of the cabin that would be occupied by maintenance personnel. Regarding hazards to maintenance personnel when entering confined spaces where inerting equipment may be located or fuel tanks after they have been inerted, confined space entry requirements established by industry and required the U.S. Occupational Safety and Health Administration for areas with potential to have oxygen depleted atmosphere would prevent injury to maintenance personnel. The oxygen-enriched air discharged from the membranes, as a byproduct, does not have a high enough oxygen concentration to create a fire hazard.

Significant FAA Questions:

- Incorporation of Modifications Resulting from SFAR No. 88: The report assumes all modifications that would be required as a result of the SFAR design review would be incorporated throughout the fleet by 2006. This assumption has a very significant affect on the predicted benefits for fuel tank inerting used in forming the conclusions in this report and it may be overly optimistic. The SFAR requires that affected type certificate holders and supplemental type certificate holders perform a safety review of their fuel tank systems and determine if their designs meet the latest requirements for precluding fuel tank ignition sources. If it does not meet those requirements, they must develop all design changes necessary to meet those requirements. The results of the design review are to be submitted to the FAA in a report by December 6, 2002. (If they can not develop all the design changes by the compliance date, they can be granted an extension of time to develop those design changes if certain conditions are

met.) The FAA will then review the reports and the design changes. If the FAA determines that modifications are required to existing airplanes, the FAA would issue proposals for airworthiness directives (ADs) that would require that the airplanes be modified by some future date. The time allowed in the final ADs to modify in-service airplanes would depend on the complexity of the modifications. The FAA questions the ability of the industry to develop all the required modifications and then modify all the in-service airplanes in the three-year period following the compliance date for the SFAR, especially considering the industries history of waiting to begin modifying in-service airplanes until after the FAA has issued final rule ADs requiring the modifications.

- Inerting Implementation Schedule: The schedule for implementing fuel tank inerting in the fleet shows no affect on safety until beyond 2010. The full affect is not shown until 2015, when all modifications are completed. This is shown for both ground-based inerting and on-board inerting designs. The data in the report also shows that inerting would be more effective in preventing fuel tank explosions than even the 75 % predicted effectiveness for SFAR 88 used in the report. Therefore, improving the implementation schedule for inerting combined with a more realistic schedule for incorporating modifications resulting from the SFAR would greatly improve the cost-benefit ratio for inerting.